High Pressure Electrochemical Oxygen Generation for ISS, Phase I

Completed Technology Project (2015 - 2015)

Project Introduction

Giner, Inc. has developed an advanced electrochemical static vapor feed oxygen (O2) concentrator (SVFOC) that offers a simple alternative to the use of pressure swing adsorption (PSA) systems to generate high pressure oxygen for ISS and future human space flight applications. The SVFOC is based on proven electrolyzer technology demonstrated at Giner and delivers a continuous stream of dry O2 with a highly controllable oxygen pressure (0-3600 psig) by feeding deionized water and air into the stack. Generation of pure oxygen at 3,600 psig is particularly applicable for filling tanks used for extravehicular activity (EVA) directly. The water necessary for the electrochemical O2 pump is delivered as vapor by Giner's water management membrane (WaMM). The system operates quietly with quick start up/shutdown and the output stream O2 pressure and rate are easily controllable. The demonstrated SVFOC concept used a modified Giner lightweight single-cell static vapor feed electrolyzer. The preliminary results established steady operation of the stack up to 500 mA/cm2 with a stack temperature < 30C. The completion of this Phase I program proposed will result in the development of a 5-cell SVFOC stack capable of producing 0.9 kg/day of pure oxygen at 3,600 psig.

Primary U.S. Work Locations and Key Partners

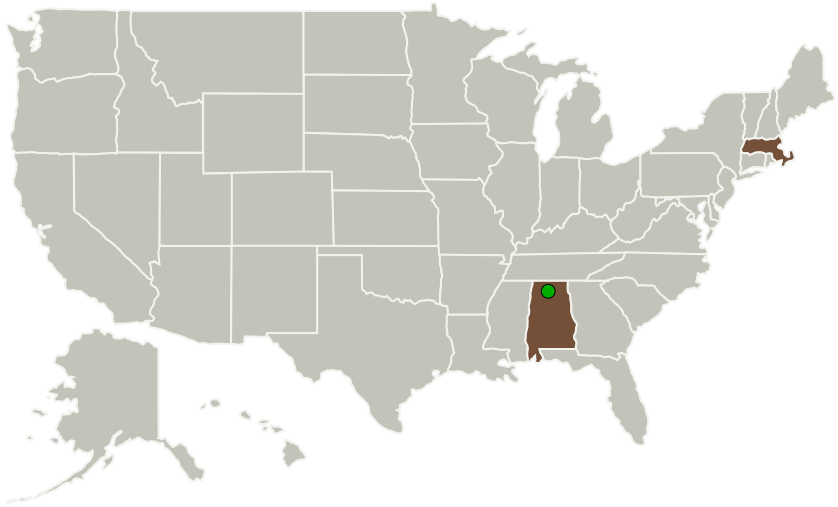

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Giner, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

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Organizations Performing Work	Role	Type	Location
Giner, Inc.	Lead Organization	Industry	Newton, Massachusetts
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	Massachusetts

Project Transitions

June 2015: Project Start

December 2015: Closed out

Closeout Summary: High Pressure Electrochemical Oxygen Generation for ISS, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/138931)*

Images

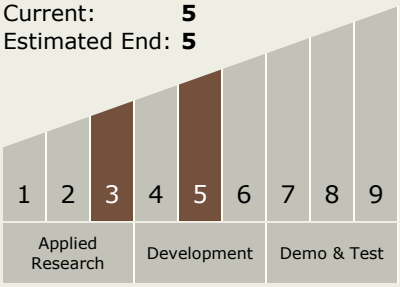
Briefing Chart Image
High Pressure Electrochemical Oxygen Generation for ISS, Phase I *(https://techport.nasa.gov/image/134432)*

Project Management *(cont.)*

Principal Investigator:
Meagan Rich

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - TX06.1.1 Atmosphere Revitalization

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System